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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,286	03/09/2004	Laxman Murugesh	006477 USA/CPS/IBSS/LP	2942

61285 7590 05/10/2007

JANAH & ASSOCIATES, P.C.
650 DELANCEY STREET, SUITE 106
SAN FRANCISCO, CA 94107

EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	**PAPER NUMBER**
1763	

MAIL DATE	DELIVERY MODE
05/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/797,286	MURUGESH ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 May 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/9/07 has been entered.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Figures 1, 2 – reference number 42 is not shown in the drawings as mentioned on page 6 at line 8 in the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Response to Arguments

Applicant's arguments filed 2/9/07 have been fully considered but they are not persuasive as explained hereunder. Applicant has amended independent claims 1, 11, 15 by adding limitations, for example in claim 1 – "self-cleaning" and "comprising first and second terminus to expel the received

process gas" and "and comprising an outer perimeter" and "plurality of first vanes configured to direct the process gas expelled from the first terminus across a chamber surface, each first vane comprising an arcuate, plate that curves outward from the hub to the outer perimeter of the baffle" and "the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas

distributor".

Further, applicant has cancelled claim 2.

Accordingly claims 1, 3-19 are now pending and active.

Rejection of Claims 1-6 and 8 under 35 USC 103 (a)

Applicant argues that Murugesh does not teach second vanes on second surface of baffle that direct process gas from the second terminus across the surface of baffle to clean the distributor and that distributor in Murugesh is not self-cleaning. Applicant also argues that Halsey when combined with Murugesh also does not teach above claim limitations.

Examiner responds that Halsey teach vanes 210, 212 on second surface of a baffle 202 and further teach that by controlling number and location of guide vanes the gas flow on the second surface of baffle can be controlled. Thus Halsey when combined with Murugesh reads on limitations of amended claim 1. Further, though Murugesh et al in view of Halsey et al do not explicitly teach that second vanes direct the gas across the second surface of the baffle to clean the distributor, the same is a functional limitation and the apparatus of prior art is considered capable of the same since it meets the functional limitation of the claim, especially that gas flow at the second surface of the baffle plate can be controlled by spacing and positioning of the vanes 210, 212 on the second surface of the baffle 202. Thus Murugesh when combined with Halsey reads on limitations of amended claim 1. and the same has been rejected under 35 USC 103 (a) as explained below. Additionally, claim 1 has also been rejected under 35 USC 103 (a) over Murugesh in view of a new reference (US Patent No. 5,643,394 - Maydan et al).

Rejection of Claim 7 under 35 USC 103 (a)

Applicant argues that Wheat et al when combined with Murugesh et al and Halsey et al does not teach limitation "a baffle having first vanes on first surface and second vanes on the opposing second surface" and "second vanes configured to direct the process gas expelled from second terminus across the surface of baffle to clean the gas distributor".

Examiner responds that as already explained above under claim 1, Murugesh in view of Halsey teach limitations of amended claim 1. Reference by Wheat et al is used since it teaches limitation of dependent claim 7 that the shape of second vane is wedge shaped. Thus Murugesh in view of Halsey and Wheat teach limitations of claim 7 and the same is rejected under 35 USC 103 (a) as explained below.

Rejection of Claims 9 and 15-19 under 35 USC 103 (a) :

Applicant argues that Frijlink when combined with Murugesh et al and Halsey et al does not teach claim limitation "a baffle having first vanes on first surface " and "second vanes configured to direct the process gas expelled from second terminus across the surface of baffle to clean the gas distributor". Applicant also argues that further, Frijlink does not teach a gas distributor having a hub comprising a gas feed-through tube capable to by-pass the first and second vanes and enter the chamber.

Examiner responds that as already explained above Murugesh in view of Halsey teach limitations of amended claim 1. Reference by Frijlink is used since it teaches gas distributor with a gas inlet tube that by-passes the gases supplied through inlet 1B (like first and second vanes) and supplies the same in the chamber, as per limitations recited in claim 9. Similarly, references by Murugesh et al when combined with Halsey et al and Frijlink also reads on limitations of amended claim 15 as explained below. Thus rejection of claims 9 and 15-19 under 35 USC 103 (a) is maintained.

Rejection of Claim 10 under 35 USC 103 (a) :

Applicant argues that Horie et al when combined with Murugesh et al and Halsey et al do not teach limitation of claim 10 like "a baffle having first vanes on first surface and "second vanes on second surface of baffle that direct process gas from the second terminus across the surface of baffle to clean the distributor".

Examiner responds that as already explained above Murugesh in view of Halsey teach limitations of amended claim 1 including a combination gas distributor for supply of process gas and cleaning gas (Figure 3 – Murugesh) . Reference by Horie is used since it teaches gas distributor with showerhead as per limitations recited in claim 10. Thus, Murugesh et al when combined with Halsey et al and Horie reads on limitations of amended claim 10 as explained below. Thus rejection of claim 10 under 35 USC 103 (a) is maintained.

Rejection of Claims 11-14 under 35 USC 103 (a) :

Applicant argues that combination of Redeker with Murugesh, Halsey and Frijlink does not teach teach claim 11 limitations.

Examiner responds that as already explained above under claims 1, 9 Murugesh in view of Halsey and Frijlink teach all limitations of claim 9. Further, Redeker et al teach an apparatus (Figures 1, 13, 16) that includes a center gas feed (gas distributor) 312 to distribute a gas from an external source across surfaces in a substrate processing chamber 12 having a wall with a cavity, the gas distributor comprising:

(a) a base (hub) 334 that fits into the cavity in the wall of the chamber, the hub comprising (i) a plurality of first channels 342 in the base (hub) 334 that mates with the cavity, the first channels comprising openings and a terminus, the openings capable of receiving the gas from the external source (ii) a second channel 304 capable of receiving the gas from the terminus of the first channels (column 16, line 60 to column 18, line 48). Thus Redeker when combined with Murugesh, Halsey and Frijlink read on all limitations of claim 11 as explained below.

Examiner also responds that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Since the combination of Redeker et al, Murugesh et al, Halsey et al and Frijlink teaches all limitations of claim 11 as explained below, the rejection of claim under 35 USC 103 (a) is maintained. Further, remaining dependent claims have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3 - 6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025).

Regarding Claim 1: Murugesh et al teach an apparatus (Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

(a) a tubular post (hub) 259 comprising a gas inlet to receive a gas and a gas outlet that includes first and second terminus 247a, 247b;

(b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface and comprising an outer perimeter;

(c) first ridges (plurality of first vanes) 245 on the first surface of the baffle, first vanes configured to direct the gas expelled from gas outlets 247 (first terminus) across process chamber 30 surface, each first vane 245 comprising curves from the hub to the outer perimeter of the baffle. Murugesh et al further teach that ridges 245 are shaped and sized to enable direct gas at pre-selected chamber surfaces. Murugesh et al also teach that gas distributor (Figure 3) can also have two outlets 85, 247 (first and second terminus) {Column 5, line 40 to Column 8, line 8).

Murugesh et al do not teach a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4A, 4B) that includes a gas diffuser 200 that has a gas inlet nozzle 302 and guide vanes 210, 212 on the (second surface of body (baffle) 202 {towards the chamber}, so that vanes 210, 212 enable flow of gas along the surface 406 (second surface) of the diffuser 200 (baffle). Halsey et al further teach that spacing and disposition of vanes 210, 212 can be adjusted to obtain desired gas flow conditions {column 5, line 45 to column 7, line 40}. Though Murugesh et al in view of Halsey et al do not explicitly teach that second vanes direct the gas across the second surface of

the baffle to clean the distributor, the same is a functional limitation and the apparatus of prior art is considered capable of the same since it meets the functional limitation of the claim, especially that gas flow at the second surface of the baffle plate can be controlled by spacing and positioning of the vanes 210, 212 on the second surface of the baffle 202.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Murugesh et al by adding vanes (second vanes) on the second surface of baffle plate as taught by Halsey et al to obtain desired gas flow profile on the second surface of the baffle plate to enable clean the gas distributor (Figure 3-Murugesh et al) {Column 3, lines 1-10}.

Regarding Claims 3: Murugesh et al teach (Figures 2A, 2B) that ridge (first vanes) 245 comprises taper from the hub 259 to the outer perimeter of the baffle 248 (Column 7, lines 1-60).

Regarding Claim 4: Murugesh et al teach (Figure 1A) that gas distributor (including tubular post 259) 215 comprises first and second channels, and the gas outlet comprises the terminus of the first channels (247a) and the terminus of the second channels (247b) {Column 6, lines 20-50}.

Regarding Claims 5, 6: Halsey et al teach (Figures 3A-3C, 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach that number of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Regarding Claim 8: Halsey et al teach that body 202 (baffle surface) can have any shape suitable for expanding gas flow (implies that shape or angle of guide vanes relative to body could be optimized) {Column 5, lines 15-35}.

Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Maydan et al (US Patent No. 5,643,394).

Regarding Claim 1: Murugesh et al teach an apparatus (Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

(a) a tubular post (hub) 259 comprising a gas inlet to receive a gas and a gas outlet that includes terminus 247a, 247b;

(b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface and comprising an outer perimeter;

(c) first ridges (plurality of first vanes) 245 on the first surface of the baffle, first vanes configured to direct the gas expelled from gas outlets 247 (first terminus) across process chamber 30 surface, each first vane 245 comprising curves from the hub to the outer perimeter of the baffle. Murugesh et al further teach that ridges 245 are shaped and sized to enable direct gas at pre-selected chamber surfaces. Murugesh et al also teach that gas distributor (Figure 3) could also have two outlets 85, 247 (first and second terminus) {Column 5, line 40 to Column 8, line 8}.

Murugesh et al do not teach a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

Maydan et al teach a gas inlet apparatus (Figures 1A, 1B, 2, 3) for a plasma processing reactor comprising blocking plate 20a (like second vane) on the bottom surface of lid 10 (like second surface of a baffle) and where the gas flow along the second surface of baffle can be controlled by optimizing the angle of annular reflectors 35A, 35B (column 4, line 25 to column 6, line 10).

Though Murugesh et al in view of Maydan et al do not explicitly teach that second vanes direct the gas across the second surface of the baffle to clean the distributor, the same is a functional limitation and the apparatus of prior art is considered capable of the same since it meets the functional limitation of

the claim, especially that gas flow at the second surface of the baffle plate can be controlled by optimizing the angle of annular reflectors on the second surface of the baffle 10.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Murugesh et al by adding vanes (second vanes) on the second surface of baffle plate as taught by Maydan et al to obtain desired gas flow profile on the second surface of the baffle plate to enable clean the gas distributor {Figure 3-Murugesh et al and Column 3, lines 1-10}.

Regarding Claims 3: Murugesh et al teach (Figures 2A, 2B) that ridge (first vanes) 245 comprises taper from the hub 259 to the outer perimeter of the baffle 248 (Column 7, lines 1-60).

Regarding Claim 4: Murugesh et al teach (Figure 1A) that gas distributor (including tubular post 259) 215 comprises first and second channels, and the gas outlet comprises the terminus of the first channels (247a) and the terminus of the second channels (247b) {Column 6, lines 20-50}.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Wheat et al (US PGPUB No. 2003/0116278).

Regarding Claim 7: Murugesh et al in view of Halsey et al teach all limitations of the claim including second vanes on second surface of baffle plate and that shape and location of vanes enable control the direction of gas flow.

Murugesh et al in view of Halsey et al do not teach that second vanes comprise plurality of wedges.

Wheat et al teach an apparatus (Figure 1) that includes a gas distributor 10 with an inlet tube 14, an outlet manifold 18 with gas outlet holes 30 and wedge-shaped baffle deflectors (vanes) 34 proximate each hole. Wheat et al also teach that the deflectors 34 can have other configurations (as per gas flow considerations) {Paragraph 0032}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use wedge shaped deflectors (vanes) as taught by Wheat et al in the apparatus of Murugesh et al in view of and Halsey et al to provide the required flow path to the gases exiting from the gas outlet holes (Paragraph 0012).

Claims 9, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Frijlink (US PGPUB No. 2004/0200412).

Regarding Claim 9: Murugesh et al in view of Halsey et al teach all limitations of the claim including that the apparatus has a hub and a baffle with first and second vanes.

Murugesh et al in view of Halsey et al do not teach that hub has a gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas introduction arrangement that comprises concentric funnels (like gas feed through tube) that include inlet 1A for first precursor gas and a separate inlet 1B for second precursor gas and where gas flow through inlet 1A by-passes the first gas (to by-pass the vanes) and enters the chamber (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas feed-through tube as taught by Frijlink in the apparatus of Murugesh et al in view of Halsey et al to enable supply plurality of gases through gas distributor.

Regarding Claims 15, 17: Murugesh et al in view of Halsey et al and Frijlink teach all limitations of the claim (as already explained above under claims 1, 9) including a baffle comprising first and second vanes and a separate gas feed-through tube that by-passes the first and second vanes, and further including remote chamber (remote plasma source 176). Further, Though Murugesh et al in view of Halsey et al and Frijlink do not explicitly teach that second vanes direct the gas across the second surface of the

baffle to clean the distributor, the same is a functional limitation and the apparatus of prior art is considered capable of the same since it meets the functional limitation of the claim, especially that gas flow at the second surface of the baffle plate can be controlled by spacing and positioning of the vanes 210, 212 on the second surface of the baffle 202.

Regarding Claim 16: Murugesh et al teach (Figure 1c) that remote plasma chamber 130 comprises gas supply (inlet)125, gas energizer (activator) 175, gas conduit (outlet) 170 [Column 4, line 40 to Column 5, line 40].

Regarding Claim 18: Murugesh et al in view of Halsey et al teach (Figure 4B) that the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas coming from remote source across the expansion surface (of gas distributor) 464. Halsey et al also teach that number of guide vanes and their location may be optimized as per process requirements (Column 5, lines 30-35).

Regarding Claim 19: Murugesh et al in view of Halsey et al and Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (like gas feed through tube) that is capable of distributing energized gas into process chamber from a remote chamber (Paragraph 0024).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Horie et al (US Patent No. 6,132,512).

Regarding Claim 10: Murugesh et al in view of Halsey et al teach all limitations of the claim (as explained above under claims 1, 9) including a combination (for process and cleaning gas) gas distributor comprising of cleaning gas distributor 200 and process gas distributor 65 having gas inlet and gas outlets 247 (Murugesh et al – Figure 3, column 7, line 65 to column 8, line 10).

Murugesh et al in view of Halsey et al do not teach process gas distributor with showerhead faceplate. However use of showerhead as gas inlet structure is known in the art as per reference cited hereunder.

Horie et al teach an apparatus (Figures 13-15) that includes a gas ejection head having a gas supply head unit 50 with a double walled structure and a showerhead type structure comprising of front nozzle disk 42 and rear nozzle disk 41, and where an outer tube 51 (with a first gas) is connected to gas supply port 46 and inner tube 52 (like for a second gas supply) is connected to showerhead plate 42 with holes 42-1 (Column 12, lines 15-68).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use process gas distributor with showerhead type gas distribution faceplate as taught by Horie et al in the apparatus of Murugesh et al in view of Halsey et al to distribute gas uniformly in the chamber.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redeker et al (US Patent No. 6,182,602) in view of Murugesh et al (US Patent No. 6,450,117), Halsey et al (US Patent No. 6,663,025) and Frijlink (US PGPUB No. 2004/0200412).

Regarding Claim 11: Redeker et al teach an apparatus (Figures 1, 13,,16) that includes a center gas feed (gas distributor) 312 to distribute a gas from an external source across surfaces in a substrate processing chamber 12 having a wall with a cavity, the gas distributor comprising:

(a) a base (hub) 334 that fits into the cavity in the wall of the chamber, the hub comprising (i) a plurality of first channels 342 in the base (hub) 334 that mates with the cavity, the first channels comprising openings and a terminus, the openings capable of receiving the gas from the external source (ii) a second channel 304 capable of receiving the gas from the terminus of the first channels (column 16, line 60 to column 18, line 48).

Redeker et al do not teach:

first channels along external surface of hub;

a baffle plate extending radially outward from the hub, the baffle plate comprising a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels;

plurality of first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub, the first vanes direct the gas expelled from first terminus across the surfaces of the chamber,,

plurality of second vanes on the second surface of the baffle plate, that direct gas from second terminus across second surface of baffle plate and each second vane comprising a surface inclined to the second surface of the baffle plate;

(iii) a gas feed-through tube that allows the gas to bypass the first and second set of vanes.

Murugesh et al teach an apparatus (Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

(a) a tubular post (hub) 259 comprising a gas inlet to receive a gas and a gas outlet,

(b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface and comprising an outer perimeter,

(c) first ridges (plurality of first vanes) 245 on the first surface of the baffle, first vanes configured to direct the gas expelled from gas outlets 247 (first terminus) across process chamber 30 surface, each first vane 245 comprising curves from the hub to the outer perimeter of the baffle. Murugesh et al further teach that ridges 245 are shaped and sized to enable direct gas at pre-selected chamber surfaces. Murugesh et al also teach that gas distributor (Figure 3) could also have two outlets 85, 247 (first and second terminus) {Column 5, line 40 to Column 8, line 8}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub and baffle plate configuration as taught by Murugesh et al in the apparatus of Redeker et al to enable uniformly remove residues having variable thickness or non-uniform chemical compositions without eroding underlying chamber surfaces (Column 1, lines 55-60).

Redeker et al in view of Murugesh et al do not teach second vanes on the second surface of the baffle and where the second vanes direct the received gas across the second surface of the baffle and a gas feed-through tube that allows the gas to bypass the first and second set of vanes.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4A, 4B) that includes a gas diffuser 200 (baffle) that has a gas inlet nozzle 302 and guide vanes 210, 212 on the second surface of body (baffle) 202 (towards the chamber), so that vanes 210, 212 enable flow of gas along the surface 406 (second surface) of the diffuser 200 (baffle). Halsey et al further teach that spacing and disposition of vanes 210, 212 can be adjusted to obtain desired gas flow conditions {column 5, line 45 to column 7, line 40}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Redeker et al in view of Murugesh et al by adding vanes (second vanes) on the second surface of baffle plate as taught by Halsey et al to achieve uniformity of gas flow (for the process gas coming through the outlet 85 – Figure 3, Murugesh et al) over the second surface of baffle plate (Column 3, lines 1-10).

Redeker et al in view of Murugesh et al and Halsey et al do not teach gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (gas feed through tube) that includes inlet 1A for first precursor gas and inlet 1B for second precursor (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas fed through tube as taught by Frijlink in the apparatus of Redeker et al in

view of Murugesh et al and Halsey et al to enable supply plurality of gases through gas distributor. Though Murugesh et al in view of Halsey et al do not explicitly teach that second vanes direct the gas across the second surface of the baffle to clean the distributor, the same is a functional limitation and the apparatus of prior art is considered capable of the same since it meets the functional limitation of the claim, especially that gas flow at the second surface of the baffle plate can be controlled by spacing and positioning of the vanes 210, 212 on the second surface of the baffle 202.

Regarding Claim 12: Murugesh et al teach (Figures 2A, 2B) the baffle 251 further comprises an outer perimeter, and wherein each ridge (first vane) 245 comprises an arcuate plate that curves outward from the hub to the outer perimeter of the baffle. Murugesh et al also teach that ridges (vanes) 245 are shaped and sized so that so as to enable fresh flow of gases over selected chamber surfaces (Column 7, lines 12-30).

Regarding Claims 13, 14: Halsey et al teach (Figure 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of adjacent surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Figure 3A-3C, Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas across expansion surface (sector of the second surface of the baffle plate) 464. Halsey et al also teach that number and location of of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Rakesh Dhingra

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763